

Overview

Over the past year, Windows to the Universe has continued a multifaceted program of support to the Earth Science Enterprise Education program. Areas of activity include continued maintenance of the W2U website and user traffic analysis, development of new and revised content and activities on the website, implementation of new tools to facilitate website development and maintenance, response to users questions and comments, professional development for educators through workshops at the National Science Teachers Association meetings and at NCAR, and dissemination of information about the project through materials distribution at NSTAs, AGUs, AMS and other venues. This report provides some background on the project and summarizes progress for the third and final year of the project.

Introduction

The Windows to the Universe web site (<http://www.windows.ucar.edu>) was started in 1995, with funding from the NASA High Performance Computing and Communications Public Uses of Remote Sensing Databases Program. The project was originally developed as a resource for informal science education, with a focus on museums and libraries. However, from the beginning, we recognized the potential of web-based information resources to support the needs of students and teachers in the K-12 classroom. Through our partnerships with educators and outreach specialists, we worked to develop a resource that could function as a small, no-cost museum exhibit (assuming computer and internet access), as well as a supporting information resource for research and exploration in libraries and the classroom.

Now in our tenth year of development, our audience of over ~6 million users per year (see Figure 1) includes large numbers of students accessing the site from schools, from home, as well as from other community centers providing web access, including an entirely new population of Spanish-speaking learners who now have access to these resources through support provided from the National Science Foundation.

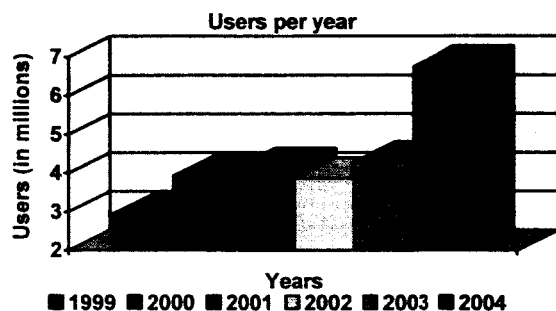


Figure 1 - User Session per year

Our approach of providing interdisciplinary science and humanities content in an intensively hyperlinked format is appreciated by our users, and facilitates both K-12 education as well as informal, curiosity driven science exploration.

Project Description

In order to serve our diverse user population, our focus has been to provide an attractive, interdisciplinary web site that

engages users and invites them to exploration of the geosciences by providing scientific

and cultural information in context. Windows to the Universe therefore spans the Earth and space sciences, ranging from the Earth as a planet to astrophysics, and including interdisciplinary arts and humanities content. In addition, the site provides information on new research discoveries, current events and space missions, links to databases and other “safe” sites of interest on the World Wide Web. To date, our site consists of 30 major sections, together composed of ~7000 html files, ~7000 images and ~690 image maps. The site is continually revised and expanded in support of Earth and space science research.

“This is a fantastic site that we are now utilizing at our middle school. We are beginning an integrated approach to teaching science & your site is a perfect teaching tool.”

Female Middle School Educator

Key popular aspects of the project include three levels of content, representing the upper elementary, middle school, and high school reading levels. By providing three levels of content for our users, we provide a remediation opportunity for users that are having difficulty understanding content at a higher level, allowing them move to a lower level. Similarly, we provide younger people the chance to challenge themselves by reaching to a higher level of content (see comment below).

In January 2004, we opened a new Spanish language version of the website that has gradually expanded to include ever more of the website. This innovation, made possible by separate funding through the NSF, has made available the content developed through this ESE award to Spanish-speaking learners around the world, and now reaches ~7000 users per day.

“Dear Windows to the Universe ‘Creators’,

I really think your web page information is excellent and helped me a lot in science class. Your graphics are wonderful and really gave me an idea of how the planets look. Also, I compliment you on your, ‘BEGINNER INTERMEDIATE AND ADVANCED’ program. You can learn info and terms in simple and more challenging layouts. Once more, thank you for such a great website.”

Female Middle School Student

Website maintenance and traffic analysis

The Windows to the Universe website has served ~6 million users annually over the past year (see Figure 1). Analysis of responses to user surveys over the past three years indicates that 74% of respondents are students. Figure 2 shows that 78% of these students are in K-12, with the remainder at the undergraduate, graduate, or continuing education levels.

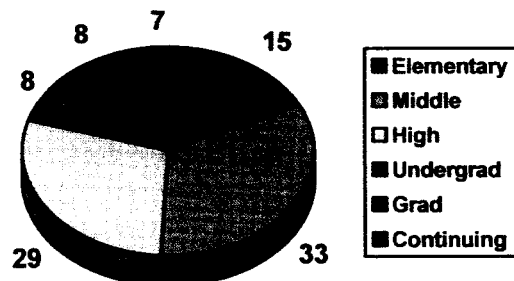


Figure 2 - Educational level of student users

Furthermore, 46% of survey respondents use the site once per week or more frequently, with users accessing the site most frequently from home and school (accounting for over 70% of responses).

Figure 3 shows the number of user sessions per month on the website from October 1, 1999 through September 30, 2003 in four curves representing different fiscal years. Comparison of the green and red curves representing the last two fiscal years shows that significant growth in traffic has occurred over the past year. About half of this increase results from the addition of the new Spanish version of the website, with the remainder a result in additional growth to the English version of the website. Growth has continued since the end of funding for this award – traffic in January of 2005 reached a new high of 854,000 users, or ~360,000 users per month higher than in January 2004. Clearly, W2U is a very effective outreach tool for reaching a global audience of formal and informal learners for the Earth and Space sciences. Figure 4 summarizes user traffic over the three fiscal years of the project.

Figure 3 - User Sessions per month 10/01-9/04

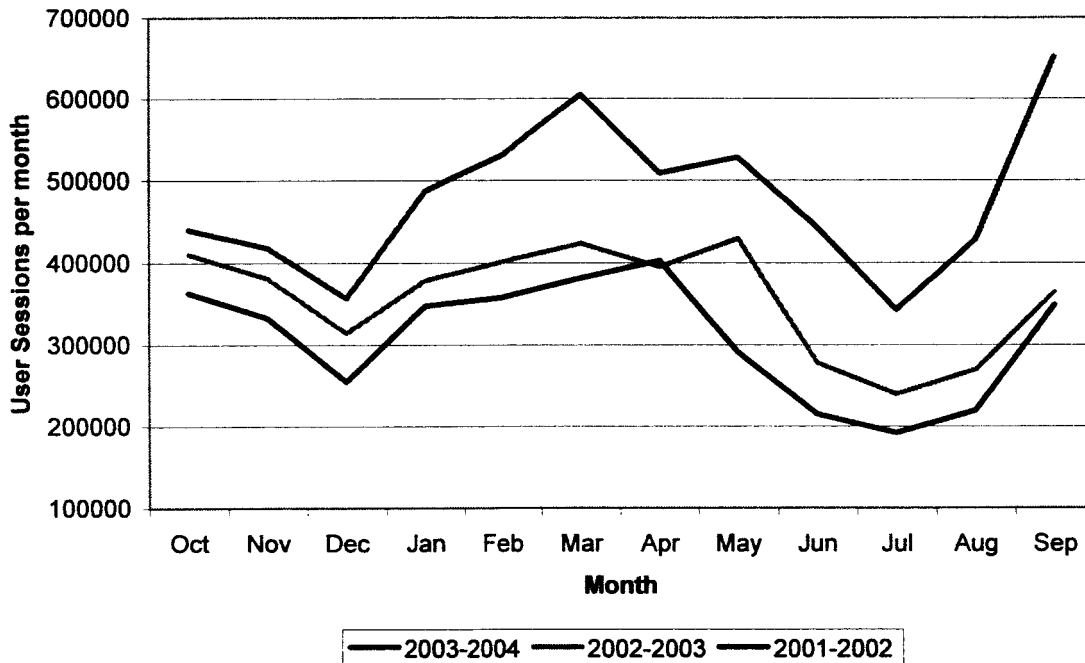
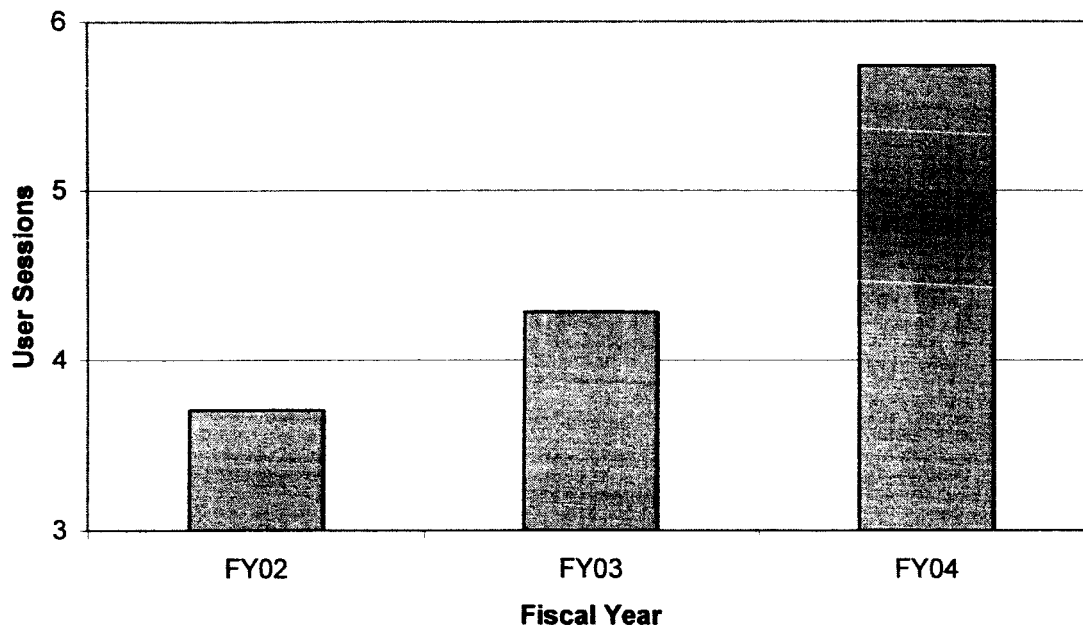


Figure 4 - User Sessions Per Fiscal Year



Content and Activities Development and Revision

Our activities over the past year have focused on development of new geoscience content and activities in support of the Anne Arundel curriculum. Over the past year, we have developed or revised 60 pages of content at three levels, which have also been translated into Spanish. The major development areas were as follows:

1. Geosphere

- a. 14 new pages plus 9 revised pages
- b. Major development was in the area of Earth environments of deposition of sedimentary rocks, especially as related to sedimentary rock findings of Mars Rovers.
- c. Additional development linked People and History section content to the geology section by organized existing profiles of geologists, creation of a new page about a well-known female geologist, and linking all geologist profiles to a new page focused on geology as a career.

2. Biosphere

- a. 16 new pages and 2 revised pages
- b. Organization of existing life content pages into a comprehensive biosphere section with additional new content about Diversity and Classification of Life, Cells, and Genetics.

In addition to content development, we have developed 12 new classroom activities for educators, and revised 4 existing activities with funding provided by this project. The list below provides titles and links to these activities:

Activities Revised

- **The Magnetometer**

http://www.windows.ucar.edu/tour/link=/teacher_resources/magnetism/teach_magnetometer.html

- **Magnetometer Extension Activities**

http://www.windows.ucar.edu/tour/link=/teacher_resources/magnetism/teach_extension.html

- **Thirsty Rocks: Please "Porous" a Drink!**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_thirsty.html

- **Take a Stab!**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_stab.html

New Activities

- **Layers of Rock**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_strata.html

- **Snack Tectonics**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_snacktectonics.html

- **Geographic Regions and Backyard Geology with the USGS Tapestry Map**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_tapestry.html

- **Mapping Ancient Coastlines**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_bathymetry.html

- **Mapping Potato Island**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_taterland.html

- **Cookie mapping**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_cookiemap.html

- **The Geography of Land Planning**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_landplan.html

- **Introduction to Maps**

http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_mapintro.html

- **Make a Classroom Map**
http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_makemap.html
- **Adaptation Investigation**
http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_beaks.html
- **Thermal Expansion and Sea Level Rise**
http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_thermalexpand.html
- **Paleoclimates and Pollen**
http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_pollen.html

Response to Users

A major area of activity for the W2U team is response to our user community. The website includes several different modes of interaction – questions through “Ask A Scientist”, comments, and survey responses. Over the past year, we received 3154 interactions with users, including 1584 Ask A Scientist questions. Although we do not have sufficient staff to respond to all user comments, we try to identify questions that are likely to be of interest to a large number of users, and answer those in one of our answer formats (Quickie Questions and Ask A Scientist responses).

Professional Development and Dissemination

W2U has been active in professional development over the past year. W2U staff attended 3 regional NSTA meetings as well as the National NSTA meeting. As is specified in more detail below, we offered hour-long workshops, short courses, and project presentations, as well as presenting at National Earth Science Teachers Association Share-a-thons and distributing materials in the exhibit areas (at the NASA booth, as well as at the Windows to the Universe and UCAR booths). Overall, we provided training to 1304 teachers in workshops, presentations, and shareathons over the past year.

Professional Development of Educators

Workshops at NSTA

1. **More than a Few Cents of Science:** A workshop that shares multiple ways of experimenting with the metal alloys in pennies in a classroom setting.
□ *(Presented Fall 2003 and National 2004: 68 participants total)*
2. **What’s Below the Surface? Activities for Learning about Earth, Inside and Out:** A workshop that provides classroom activities that allow students to visualize the three dimensional structure of the planet
□ *(Presented Fall 2003 and National 2004: 182 participants total)*
3. **WALLS!** A workshop of classroom activities that unites the 5 spheres of the Earth system.
□ *(Presented Fall 2003: 380 participants total)*
4. **Windows to the Universe** presentation

- *(Presented Fall 2003 and National 2004: 46 participants total)*
- 5. **Cut It, Stab It, Slice It:** A workshop about how to teach Earth science using potatoes!
 - *(Presented Fall 2003: 150 participants total)*
- 6. **Sharethons .**
 - *(Presented Fall 2003 and National 2004: Approximately 420 participants)*
- 7. **Making Rocks Relevant Short Course (Reno, Fall 2003)** 21 participants for a 4-hour course.

Workshops at NCAR

June 2004 Modeling in the Geoscience Workshop, Boulder CO

- Windows to the Universe Presentation (17 teachers for 1 hr computer lab session)
- Focus Group interviews with teachers regularly using site

July 2004 Climate and Global Change Workshop, Boulder CO

- Windows to the Universe Presentation (20 teachers for 1 hr computer lab session)

Dissemination

W2U has also distributed information on the project through numerous venues over the past year. These include the AGU meetings, AMS meetings, as well as through the NASA OSS and ESE distribution network. Information about W2U has also been distributed by the Earth Science Enterprise through their outreach materials (Resource Directory and related web site lists). In addition, we are regularly contacted by educators and education program managers who want to give their own workshops on the website or distribute materials on the project at their own events. Finally, information about the website is distributed to the public, students, and educators at the NCAR Mesa Laboratory. Over the past year, we have distributed over ~6000 sets of informational materials on the project.